



PATENT
Attorney Docket No.: 16869K-103200US
Client Ref. No.: 638/SM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

SHINICHI NAKAYAMA et al.

Application No.: 10/758,617

Filed: January 13, 2004

For: METHOD OF CONTROLLING
STORAGE DEVICE CONTROLLING
APPARATUS, AND STORAGE
DEVICE CONTROLLING APPARATUS

Customer No.: 20350

Examiner: Unassigned

Technology Center/Art Unit: 2112

Confirmation No.: 6350

PETITION TO MAKE SPECIAL FOR
NEW APPLICATION UNDER M.P.E.P.
§ 708.02, VIII & 37 C.F.R. § 1.102(d)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is a petition to make special the above-identified application under MPEP § 708.02, VIII & 37 C.F.R. § 1.102(d). The application has not received any examination by an Examiner.

(a) The Commissioner is authorized to charge the petition fee of \$130 under 37 C.F.R. § 1.17(i) and any other fees associated with this paper to Deposit Account 20-1430.

01/05/2005 GWORDOF1 00000029 201430 10758617

01 FC:1464 130.00 DA

(b) All the claims are believed to be directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, then Applicants will make an election without traverse as a prerequisite to the grant of special status.

(c) Pre-examination searches were made of U.S. issued patents, including a classification search, a computer database search, and a keyword search. The searches were performed on or around July 13, 2004, and were conducted by a professional search firm, Kramer & Amado, P.C. The classification search covered Class 710 (subclasses 5, 40, and 74), and Class 711 (subclasses 162 and 165). The computer database search was conducted on the USPTO systems EAST and WEST. The keyword search was conducted in Classes 710 (subclass 36), and 711 (subclasses 112, 113, and 114). The inventors further provided references considered most closely related to the subject matter of the present application (see items #5 and #6 below), which were cited in the Information Disclosure Statement filed with the application on January 13, 2004.

(d) The following references, copies of which are attached herewith, are deemed most closely related to the subject matter encompassed by the claims:

- (1) U.S. Patent Publication No. 2002/0178143 A1;
- (2) U.S. Patent Publication No. 2003/0105767 A1;
- (3) U.S. Patent Publication No. 2004/0133718 A1;
- (4) European Patent Publication No. EP 1291755 A2;
- (5) Japanese Patent Publication No. 2002-351703; and
- (6) U.S. Patent Publication No. 2002/0152339 A1.

(e) Set forth below is a detailed discussion of references which points out with particularity how the claimed subject matter is distinguishable over the references.

A. Claimed Embodiments of the Present Invention

The claimed embodiments relate to a storage device controlling apparatus and a method of controlling the same.

Independent claim 1 recites a method of controlling a storage device controlling apparatus. The controlling apparatus includes a plurality of channel controllers having a circuit

board on which are formed a file access processing section receiving requests to input and output data in files as units from an information processing apparatus via a network and an I/O processor outputting to a storage device I/O requests corresponding to the requests to input and output data; and a disk controller executing input and output of data into and from the storage device in response to the I/O requests sent from the I/O processors and managing a memory area provided by the storage device in logical volumes, which are memory areas logically set on the memory area. A plurality of the same logical volumes are assigned to each of the plurality of channel controllers. The plurality of channel controllers have stored in at least one of the plurality of the same logical volumes information that is necessary for the channel controller which has not failed to take over processing of the channel controller which has failed when failure occurs. The method comprises receiving, by at least one of the channel controllers, data specifying an assignment of a logical volume to the channel controller, the data being sent from the information processing apparatus; storing the received assignment by the at least one channel controller; and when one of the channel controllers fails, processing a read/write request from the information processing apparatus by a channel controller which has not failed.

Independent claim 11 recites a storage device controlling apparatus comprising a plurality of channel controllers having a circuit board on which are formed a file access processing section receiving from an information processing apparatus requests to input and output data in files as units via a network and an I/O processor outputting to a storage device I/O requests corresponding to the requests to input and output data; and a disk controller executing input and output of data into and from the storage device in response to the I/O requests sent from the I/O processors, and managing a memory area provided by the storage device in logical volumes, which are memory areas logically set on the memory area. A plurality of the same logical volumes are assigned to each of the plurality of channel controllers. At least one of the channel controllers comprises a section receiving data specifying an assignment of a logical volume to the channel controller, the data being sent from the information processing apparatus; and a section storing the received assignment. When one of the channel controllers fails, a read/write request from the information processing apparatus is processed by a channel controller which has not failed. The plurality of channel controllers store, in at least one of the plurality of

the same logical volumes, information that is necessary for the channel controller which has not failed to take over processing of the channel controller which has failed when failure occurs.

One of the benefits that may be derived is that the assignment to the channel controllers can be done from the information processing apparatus, e.g., by use of the setting Web page. Therefore, the user of the information processing apparatus can easily assign and manage the LUs (logical units) according to the user's own needs.

B. Discussion of the References

None of the following references disclose or suggest receiving, by at least one of the channel controllers, data specifying an assignment of a logical volume to the channel controller, the data being sent from the information processing apparatus; storing the received assignment by the at least one channel controller; when one of the channel controllers fails, processing a read/write request from the information processing apparatus by a channel controller which has not failed; and storing, by the plurality of channel controllers in at least one of the plurality of the same logical volumes, information that is necessary for the channel controller which has not failed to take over processing of the channel controller which has failed when failure occurs.

1. U.S. Patent Publication No. 2002/0178143 A1

This reference discloses a storage system for managing the total capacity of hard disk drives to store block-basis data and file-basis data with a shared storage medium and a managing means for managing all the storage areas in the storage medium. The total capacity of hard disk drives can be used effectively and the management thereof is easy to reduce the Total Cost of Ownership (TCO) of the storage system. When block data is to be written, the block data is input to the storage system through a fiber channel port 50. Then, the block data input/output means 10-a processes the block data according to the protocol required by the fiber channels and converts its data format into a data format that is internally applied in the storage system 1. The logical volume management means 30 derives the address of a logical volume 35-a to write the block data from the address transmitted with the data. When the file data is to be written, the file data is input to the storage system through an Ethernet port 52. Then, the file

data input/output means 10-b the file data according to the required Internet Protocol, and converts its data format to the data format for the file system 20. See paragraphs [0088]-[0101].

2. U.S. Patent Publication No. 2003/0105767 A1

This reference discloses a storage system including multiple interfaces for external connection, multiple disks accessed from multiple interfaces, and a shared memory accessed from multiple interfaces. In the embodiment shown, a SAN interface and a NAS interface are integrated with each other having high reliability in which even when a trouble occurs, no data is lost, and high-performance access to the same file system made by an arbitrary number of NAS interfaces is maintained. The file server 113 has the means 111 for holding file system management information and the log management means 112. The means 111 for holding file system management information holds the metadata such as the attribute of the file, the list of the disk block within the file system, and the file data, and updates the internal information whenever a change occurs in the file system. Because the storage system is adapted to store the log synchronously with the change of the file system, it is possible to leave all of the changed data. Also, since the shared memory 180 is nonvolatile, the changed data is not lost at all. In addition, even when a trouble occurs in the file server 113, it is possible that the log data in the log storage area 186 is referred after reactivation to restore the file system to the newest state. See paragraphs [0036]-[0039].

3. U.S. Patent Publication No. 2004/0133718 A1

This reference discloses a storage system including a storage controller and storage media for reading data from or writing data to the storage media in response to block-level and file-level I/O requests. The storage controller includes suitable interfaces for receiving the read/write requests and effecting the reading of data from or the writing of data to the storage media. The storage system provides a direct access to physical storage devices that can be shared between a block interface and a file interface. The storage controller 14 employs a logical volume management in order to share the resources of the physical disk units 20 between block system and file system interfaces. Block system I/O read or write requests will be received by the SCSI interface adaptor 26 on a SCSI bus 16a. File system requests are received by one of the

file system interfaces: the NFS, the CIFS, or the HTTP interface adapter. See paragraphs [0037], [0042], and [0044]-[0046].

4. European Patent Publication No. EP 1291755 A2

This reference discloses a storage system (1) that effectively manages the total capacity of hard disk drives (44) to store block-basis data and file-basis data with a shared storage medium and a managing means (30) for managing all the storage areas in the storage medium. When block data and address are input through a fiber channel port (50), a block data input/output means (10a) converts its data format to a data format that is internally applied by the storage system (1). When file data and address are input through an Ethernet port (52), a file system (20) converts its data format to the data format internally applied by the storage system (1), such as the block data format. The file system (20) derives the address of a logical volume from the received address information and translates file data to block data. The managing means (30) derives the address of a logical volume (35a, 35b) to which to write block data from the address information delivered from the block data input/output means (10a). The managing means (30) translates this address or the address passed from the file system (20) to a physical address and writes data to or read data from a hard disk drive (44) with the physical address.

5. Japanese Patent Publication No. 2002-351703

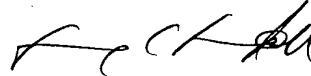
This reference relates to a storage device which is easy to manage by effectively utilizing a drive capacity in the coexisting environment of the storage device of block form data and that of file form data. A block data input/output processing part 10-a converts block data and an address from a fiber channel port 50 to a data format inside of the storage device 1. A file data input/output processing part 10-b converts file data and an address from an Ethernet (registered mark) to the data format of the file system 20. The file system 20 indexes the address of a logical volume 35-b from the address of the system 20 and converts the file data into block data. A logical volume management part 30 indexes the address of a logical volume 35-a for writing the block data from the address outputted by a processing part 10-a, converts this address or the address from the file system 20 to a physical address and writes/reads data to a drive.

6. U.S. Patent Publication No. 2002/0152339 A1

This reference contains disclosure that is found in item #3 above, which is a continuation-in-part of this reference.

(f) In view of this petition, the Examiner is respectfully requested to issue a first Office Action at an early date.

Respectfully submitted,



Chun-Pok Leung
Reg. No. 41,405

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, 8th Floor
San Francisco, California 94111-3834
Tel: 650-326-2400
Fax: 415-576-0300
Attachments
RL:rl
60279763 v1